COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

CONSTRUCTION OF NEW 23 kV SUB-TRANSMISSION LINE FROM KING STREET #18 SUBSTATION

TESTIMONY OF BRIAN V. HAYDUK

Q. Will you please identify yourself by stating your full name, your business address and connection or position with respect to the Petitioner?

A. My name is Brian V. Hayduk. My business address is 4145 Quaker Lane in North Kingstown, Rhode Island. I am a Lead Senior Engineer working in the Distribution Planning and Engineering Department at The Narragansett Electric Company performing area distribution planning and feeder management activities. I have been working at The Narragansett Electric Company for approximately ten years where I have held various assignments in Operations Engineering and Distribution Planning and Engineering Departments. I was relocated to the Massachusetts Electric Company headquarters in Northborough, Massachusetts in early 2002 on a temporary basis to work on the King Street Area Sub-transmission Study for the North and Granite Division of Massachusetts Electric Company.

Q. Mr. Hayduk, please state your educational qualifications in the field of electric utilities.

A. I graduated from Northeastern University in 1992 with a Bachelors of Science in Electrical Engineering with a concentration in Electric Power Systems. I am currently attending Worcester Polytechnic Institute part-time, working towards a Masters Degree in Power Systems Management, which I anticipate to complete in the spring of 2004.

Q. Mr. Hayduk, are you a registered Professional Engineer?

A. Yes.

Q. Mr. Hayduk, could you please state the purpose of your testimony regarding the petition to construct new lines in Groveland and Georgetown?

A. I am providing testimony to justify the necessity of the proposed line from a system planning perspective. In September of 2003, I completed a study of the sub-transmission system served from King Street #18 Substation for a ten year period from 2004 through 2013. The purpose of my study is to ensure that the sub-transmission system continues to perform satisfactorily from the standpoints of reliability and voltage as well as maintaining the ability to serve the increasing load demands of customers supplied from this system in an economical and practical manner. Study findings and recommendations for sub-transmission line improvements were documented in a memorandum to Mike P. DiBenedetto issued on November 17, 2003. The memorandum is attached as Exhibit BVH-1.

Q. Please describe the sub-transmission system in the area you studied.

A. King Street #18 Substation is served radially via two 115 kV

transmission lines where voltage is stepped down to 23 kV. Six 23 kV sub-transmission lines feed 12 Massachusetts Electric substations, six municipal substations and seven large commercial and industrial customers via 86 circuit-miles of overhead and underground lines. The supply system serves approximately 36,750 Massachusetts Electric customers in the communities of Amesbury, Boxford, Haverhill, Newbury, Newburyport, North Andover, Salisbury, Topsfield and West Newbury as well as municipally served customers in Georgetown, Groveland, Ipswich, Merrimac and Rowley.

Q. Mr. Hayduk, would you discuss from the standpoint of the petitioner, the purpose and necessity for building the line which is the subject of your testimony?

A. The line is proposed as part of a plan to address a number of thermal overload and voltage performance issues on the 23 kV sub-transmission system supplied from King Street #18 Substation in Groveland, Massachusetts. The area was studied as recently as 1997 with recommendations for improvements through the year 2006 based on a projected peak King Street #18 Substation total load of 173 MW in the year 2006. Actual load significantly exceeded study projections however, as the actual peak load in the summer of 2002 was 190 MW. As a result, a number of normal and contingency loading issues that were not anticipated in the 1997 study now exist on the sub-transmission system. In 2003, the following major area sub-transmission problems arose: (1)

normal thermal overloads at a number of points on the sub-transmission system during peak loading levels, (2) low voltage at the extremities of the sub-transmission system on peak, during normal conditions, and (3) contingency thermal overloads occurring when one sub-transmission line trips and the remaining line is required to carry its normal peak load plus the load that automatically transfers over from the interrupted line. Voltage on the remaining line sags to unacceptable levels (with possible voltage stability concerns) during these peak load periods.

Q. Please explain the standard that determines acceptable and unacceptable line voltage sags.

A. National Grid Engineering Design Procedure EDP-PLN-1-1998 (attached as exhibit BVH-2) specifies limits on maximum allowable voltage regulation at substation buses for normal and emergency conditions. National Grid EDP-DIV-21-2001 (attached as exhibit BVH-3) follows ANSI Standard C84.1 "American National Standard for Electric Power Systems and Equipment" which specifies acceptable voltage limits at the customer's connection point. There are two ranges that are specified—ANSI Range A and Range B. Range A specifies a maximum and minimum voltage level as a percent of nominal service voltage during normal operating conditions. Range B specifies a maximum and minimum voltage level as a percent of nominal service voltage during abnormal operating conditions. Based on projected peak loads for 2004, I

have determined that voltages at the extremities of the sub-transmission system will be in violation of the standards as described above.

Q. Can you describe the proposed improvements to the sub-transmission system and explain how they will address the problems you previously described?

A. As stated earlier, the proposed line is part of a larger plan to resolve issues on the sub-transmission system supplied from King Street #18 Substation. The full scope of the recommendations (including the new line) is as follows;

- Installation of a new 23 kV line (2319) from King Street #18 Substation to the 2373 bifurcation at the "Mill Street Junction" which is approximately 1.6 miles in length.
- Installation of a new 23 kV getaway (2403) from King Street #18 Substation to the 2396 bifurcation outside the substation fence which is approximately 200 feet in length.
- Installation of a 19.2 MVAr, 23 kV substation capacitor bank at Ipswich Municipal Substation.
- Reconductoring of four sections of existing 23 kV lines on the 2373 and 2394 lines.
- Upgrade of six existing 23 kV pole-top capacitors.

The recommended sub-transmission plan addresses the normal and contingency thermal overload of existing lines by the addition of the new line and the reconductoring of portions of existing lines. Voltage issues

will be resolved by the addition of a capacitor bank at Ipswich Municipal Substation as well as upgrades of existing pole-top capacitor banks. The recommended 23 kV line work will help to improve the voltage profile across the 23 kV system through the year 2007 based on the most aggressive load forecast.

Q. Mr. Hayduk, in your study did you review other options to remedy the problems on the sub-transmission system as you have described them?

A. Yes, other options were reviewed as part of the study to resolve the issues described previously. Specifically, I reviewed an alternative that involved the extension of the proposed 2319 line beyond the "Mill Street Junction" to a new 23 kV switching substation to be located on a suitable parcel of land in the vicinity of the Rowley Municipal Substation. In turn, this work would negate the need for the substation capacitor bank at Ipswich Municipal Substation and the various line upgrades as described in the recommended plan. The Company did not select this option as the recommended plan for two reasons: cost and timing. The cost of this alternative was estimated to be 73% higher than that of the recommended plan. Additionally, the significantly greater permitting and licensing complexity associated with extending the line an additional 3.5 miles beyond the Mill Street Junction coupled with acquiring land to build a new 23 kV switching substation would likely delay the completion time of these improvements beyond the next peak loading season (summer of 2004).

Q. Based on the evidence that you have provided and your personal knowledge of this particular project, and your experience in the field of electric utilities, in your opinion, are the facilities which are the subject of this testimony necessary for the purposes claimed by the petitioner and described by you, and will they serve the public convenience and be consistent with the public interest?

A. The analysis performed in the study indicate that additional infrastructure improvement in the 23 kV sub-transmission system served from King Street #18 Substation is needed immediately to ensure that reliable and quality electric service is provided to the customers supplied from this system. The recommended plan makes these improvements in the most cost-effective and expeditious manner while causing the least amount of impact to the environment and local area customers. In my opinion, these facilities are necessary and are in the public's best interest.

Q. Does this conclude this testimony?

A. Yes, it does.

EXHIBIT LIST

Exhibit BVH-1	King Street Area Sub-transmission study—recommended 23 kV supply improvements.
Exhibit BVH-2	National Grid Engineering/Design Procedure EDP-PLN-1-1998, "Guide for Area Supply and Distribution Planning"
Exhibit BVH-3	National Grid Engineering/Design Procedure EDP-DIV-21-2001, "Setting Regulators on Massachusetts Electric Company's Distribution Feeders